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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,845	05/18/2007	Weol Dong Cho	11983.17	4959
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Workman Nydegger 1000 Eagle Gate Tower 60 East South Temple Salt Lake City, UT 84111			EXAMINER SHEVIN, MARK L	
			ART UNIT 1793	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/568,845

Applicant(s)

CHO ET AL.

Examiner

MARK L. SHEVIN

Art Unit

1793

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) 17-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) 25 and 26 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-16, 23 and 24 is/are rejected.
- 7) ☐ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 February 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 05/22/2006
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status and Confirmation of Election

1. Claims 1-26, filed June 5th, 2009, are pending. Applicants are correct in that claims 1-16 and 23-**26** are drawn to a method while 17-**22** are drawn to a product by process. Claims 17-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 5th, 2009.

Priority

2. The instant application is a national stage entry of PCT/US04/26902, filed August 18th, 2004, which in turn claims priority from provisional application 60/495,903, filed August 18th, 2003.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted May 22nd, 2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement has been considered by the examiner. Please refer to applicants' copy of the 1449 form submitted herewith.

Claim Objections

4. **Claim 1** is objected to because of the following informalities: The second step of claim 1 reads "...remainder of the scrape..." and thus scrap is misspelled. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. **Claims 8-11** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "...melting point of the EAF slag...". There is insufficient antecedent basis for this limitation in the claim as claim 8 refers to a $\text{Na}_2\text{O}-\text{B}_2\text{O}_3-\text{SiO}_2$ based slag and a "modified EAF slag" based on $\text{CaO}-\text{SiO}_2-\text{B}_2\text{O}_3$, not simply an "EAF slag". It is unclear whether claim 8 assumes that both slags are "EAF slags" or whether the claim is referring to the second $\text{CaO}-\text{SiO}_2-\text{B}_2\text{O}_3$ slag, requiring that it be used instead of the first, and adding an additive content.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. **Claims 1, 6, and 15** are rejected under 35 U.S.C. 102(b) as being anticipated by Herter (US 4,517,016).

Herter provides ferrous scrap containing copper in the form of vehicle scrap (col. 2, line 57 to col. 3, line 6 and Table I) and inherently oxidizes the copper in the ferrous

scrap at a rate higher than the oxidation rate of the remainder of the scrap as Herter's process oxidizes ferrous scrap in the same temperature range as the instant claims as produces the same oxide as disclosed in the instant specification - cuprite (Cu_2O). The oxidized scrap is "impacted" by the continual tumbling and movement induced by the rotary kiln such that spalled oxides are collected by a dust collector **20** (Figure 1). Furthermore, at least some oxides would be expected to survive the reducing section of the rotary kiln and thus by "impacted" in the later autogenous mill.

With respect to the system of claim 15, Herter has a shredder for providing ferrous scrap containing copper, a rotary kiln for oxidizing the copper in the ferrous scrap, and both a rotary kiln and an autogenous mill for impacting the oxidized scrap.

Regarding claim 6, the rotary kiln movement of the ferrous scrap of Herter and the autogenous mill tumbling read on the impacting operations of "tapping or shaking."

7. Claims 1, 6, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by **Sato** (US 3,669,644)

Sato discloses that pieces of copper-clad ferrous metal (ferrous scrap) **4** are roasted in the presence of air between 1500 °F (815 °C) and 1950°F (1066 °C) to form a copper-rich scale (col. 1, lines 60-65) and mainly cuprous oxide (col. 2, lines 22-24 and col. 3, lines 22-36). The scale-coated ferrous pieces are quenched (col. 1, lines 65-67) and the scale separated from the base ferrous metal by tumbling, vibration, or rotation (col. 2, lines 35-42). The copper is inherently oxidized in the ferrous scrap at a rate higher than the oxidation of the remainder of the scrap as Sato's process oxidizes

ferrous scrap in the same temperature range as the instant claims as produces the same oxide as disclosed in the instant specification - cuprite (Cu_2O).

With respect to the system of claim 15, Sato implicitly has a means for providing ferrous scrap containing copper as this scrap material is provided to a roasting furnace 6, which is a means for oxidizing the copper, and also has a scale separation zone 8 which has a means for impacting the oxidized scrap such as by vibrating or rotating screens (col. 2, lines 35-42).

Regarding claim 6, The scale-coated ferrous pieces are quenched (col. 1, lines 65-67) and the scale separated from the base ferrous metal by tumbling, vibration, or rotation (col. 2, lines 35-42) which reads on tapping or shaking plus Example 1 had the scale removed by tumbling, which reads on both tapping and shaking.

8. Claims 1 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Tokumitsu (JP 07-258760)

Tokumitsu provides ferrous scrap containing copper (Abstract), oxidizes the copper in the ferrous scrap at a higher rate than the oxidation of the remainder of the scrap as forming copper sulfide from copper is an oxidation reaction and the copper is inherently oxidized at a higher rate than the remainder of the scrap as it spalls off the surface of the ferrous scrap leaving ferrous scrap behind, and the oxidized scrap is impacted by tumbling and dropping the ferrous scrap (para 0009).

With respect to the system of claim 15, Tokumitsu has a means for providing ferrous scrap containing copper in that ferrous scrap containing copper was provided to

an rotary furnace for elevated temperature reaction with sulfur (means for oxidizing the copper...) and also has a means for impacting the oxidizing scrap in the rotary kiln (para 0012).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Joint Inventors

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. **Claim 4** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Herter** (US 4,517,016), **Sato** (US 3,669,644), or **Tokumitsu** (JP 07-258760).

The disclosures of Herter, Sato and Tokumitsu were discussed above. These references do not recite the specific range of temperatures of oxidation as defined in the instant claim.

It would have been obvious to one of ordinary skill in ferrous scrap treatment, at the time of the invention, to select any portion of the claimed range, including the claimed range from the overlapping range of oxidizing temperatures as disclosed in the prior art because the prior art method in the entire disclosed range has a suitable utility and the normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.""); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). From MPEP § 2144.05: In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). In addition, "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). Also see, *In re Geisler* 43 USPQ 2d 1365 (Fed. Cir. 1997) and *In re Malagari*, 182 USPQ 549, 554 (CCPA 1974).

11. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Tokumitsu** (JP 07-258760).

Although Tokumitsu did not specifically teach "tapping or shaking" as particular means of impacting the ferrous scrap, it would have been obvious to one of ordinary

skill in ferrous scrap treatment to modify the impacting or shock removal process of Tokumitsu to use tapping or shaking as this would be a simple substitution of a known scale removal process to obtain the same predictable end result of scale removal.

12. Claims 2, 3, 7, 12, 13, 14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Herter** (US 4,517,016) in view of **Katayama** (JP 04-354831).

The disclosure of Herter was discussed above, however Herter did not disclose fluxing the oxidized scrap after it is impacted.

Katayama:

Katayama heats ferrous scrap containing copper in a molten flux to migrate copper into the flux layer and separate copper (Purpose). Ferrous scrap is preheated in vessel 1 and transferred to a second heating vessel 2 and the copper is heated above its melting point and migrated into a flux of 3 or more of SiO₂, CaO, Al₂O₃, MnO, FeO, Na₂O, B₂O₃, CaF₂, and NaF with the separated copper settled and separated from the molten flux by a specific gravity difference and the flux recycled (Abstract).

Regarding claims 2 and 14, it would have been obvious to one of ordinary skill in ferrous scrap treatment, at the time of the invention to further flux the impacting scrap after Herter's scale removal process as Herter teaches that the ferrous scrap after removing the copper oxide and other impurity scale is sufficiently reduced in residual alloy content to permit its use as a charge for electric steelmaking furnaces (col. 2, lines 20-26) however Table 1 showed that Herter's process only removed 49.6 wt% of Cu on average from copper containing ferrous scrap while Katayama's process removes

further copper still adhered to the scrap by melting copper and passing it into a flux thus increasing the purity of the scrap.

Regarding claim 3, Kitayama separate a copper-containing slag portion from the steel portion created by the fluxing process using specific gravity differences. (Abstract).

Regarding claim 7, Kitayama teaches using a slag with three or more of SiO_2 , CaO , Al_2O_3 , MnO , FeO , Na_2O , B_2O_3 , CaF_2 , and NaF .

Regarding claims 12 and 13, the separation is performed by a metallurgical process of separating the copper from the steel using specific gravity differences where the part containing copper is separated from the steel portion which reads on sloughing as an upper phase is implicitly separated from a lower phase of denser steel.

Regarding claim 16, Kitayama's vessel 2 provides the means for fluxing the scrap after it is impacted.

13. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hartman** (US 5,387,273).

Hartman:

Hartman discloses a process for removing copper from a copper/solid ferrous scrap metal mix. Hartman's process is as follows (col. 2, lines 25-50):

- (a) Placed ferrous scrap in a reactor vessel
- (b) Purging the reactor vessel with inert or oxidizing gas
- (c) Heating the reactor to an elevated temperature

(d) Introducing air into the reactor vessel and then hydrogen chloride to produce an oxidizing and chloridizing atmosphere which oxidizes the ferrous scrap and oxidizes/chloridizes the copper in the ferrous scrap to a copper monochloride gas

(e) Collecting the copper monochloride gas for conversion to recoverable copper species

Copper is said to be completely removed from the copper/solid ferrous scrap metal mix (col. 3, lines 27-40 and col. 4, lines 54-65). The preferred temperature for the reaction is between 600° C and 927° C (col. 4, lines 27-30). An example of the process is provided starting at col. 5, line 46.

Hartman further teaches that ferrous scrap is an important source of iron in steel making (col. 1, lines 20-25) and that the contents of tramp elements such as Cu is important to electric steel making in terms of as electric steel making uses 100% scrap as the charge source (col. 1, lines 29-33). Hartman's goal is to remove copper from ferrous scrap to improve the quality of scrap metal provided to later steel making operations (col. 2, lines 1-10).

Regarding claims 23 and 24, it would have been obvious to one of ordinary skill in ferrous scrap metal treatment, at the time of the invention, to have provided a ferrous scrap containing copper, convert the ferrous scrap to a partially purified scrap, and then convert the partially purified scrap into purified steel by removing about 90 to less than 100 wt% of the total copper as Hartman taught a process of removing copper from ferrous scrap metal, which implicitly creates partially-purified scrap as the process runs and the partially purified scrap is converted to purified steel by completely removing

copper (which reads on the claimed range of about 90 to less than 100 wt% of the total copper - col. 3, lines 27-40 and col. 4, lines 54-65). While Hartman does not have an explicit step of converting the partially purified scrap into purified steel by removing the claimed amount of copper, Hartman does provide clear motivation to do so in that Hartman's goal is to remove copper from ferrous scrap to improve the quality of scrap metal provided to later steel making operations (col. 2, lines 1-10).

Allowable Subject Matter

14. Claims 25 and 26 are allowed. The following is a statement of reasons for the indication of allowable subject matter:

The closest prior art of Herter, Sato, Hartman while oxidizing the copper scrap, do not teach dissolving the copper oxide into a molten slag by removing 90 to less than 100 wt% of the copper in the scrap.

Furthermore, claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The closest prior art of Herter, Sato, and Tokumitsu do not teach oxidizing ferrous scrap at both a temperature and a time within the claimed range.

Claims 8-11 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The closest prior art of

Katayama, while teaching a slag of the broader families of instant claim 7, does not teach lowering the melting point of his slag by mixing an additive with the oxidized slag.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

L. Savov et al., Copper and Tin in Steel Scrap Recycling, *RMZ – Materials and Geoenvironment*, Vol. 50, No. 3, (December 2003), pp. 627-640.

- Claims 1-4, 6-16, and 23-24 are rejected**
- Claims 25 and 26 are allowed**
- Claims 5 and 8-11 are objected**

The rejections above rely on the references for all the teachings expressed in the text of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Art Unit: 1793

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark L. Shevin/

August 25th, 2009
10-568,845

/George Wyszomierski/
Primary Examiner
Art Unit 1793